

**REMARKS**

Claims 1, 3-13, and 16-23 are all the claims presently pending in the application. Claims 1, 8, and 16 are independent. Claims 14-15 have been canceled.

Claims 1, 8-9, 16, and 18 have been amended.

These amendments are made only to more particularly point out the invention and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Claims 1, 3, 5, 7, and 21<sup>1</sup> stand rejected under 35 U.S.C. 102(b) as being anticipated by Lin et al. (US Pub. 2002/0131145).

Claim 4 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '145 in view of Lin et al. (US 6,603,151).

Claims 6, 8-9, 14-20, and 22-23 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '145 in view of Lowery et al. (US 6,351,069).

Claims 10-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. '145 in view of Hata et al. (US Pub. 2003/0057434).

These rejections respectfully are traversed.

**I. THE CLAIMED INVENTION**

As recited by claims 1, 8 and 16, the invention includes a feature that "the transparent structure comprises a side surface through which light radiated from the light emission surface is discharged from the transparent structure". This feature yields the following effects: (a) "Since light is radiated through the transparent structure **5**, the light emission density lowers and a light distribution characteristic different from that of LED chip **3** by itself can be obtained. Therefore, light can be efficiently applied to phosphor in light transmitting resin **8**. Due to this, yellow light wavelength-converted is uniformly mixed with blue light and, thereby, unevenness in emission color can be prevented" (see page 10, lines

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<sup>1</sup> Claim 7 depends from, and is presumed by Applicant for purposes of this response to stand rejected with, claim 17. Claims 22 and 23 depend from, and similarly are presumed to stand rejected with, claims 8 and 16, respectively.

19-25 of the present application); and (b) “Since the light emission area is enlarged due to the transparent structure 5, the light shield effect caused by covering the LED chip with phosphor can be reduced and, thereby, the brightness can be enhanced” (see page 10, lines 26-29 of the present application).

In addition, as recited by claims 1, 8 and 16, the invention includes a feature that “the transparent structure is optically connected with the entire light emission surface”. This feature yields reliably the above effects (a) and (b) in cooperation with the above feature, “side surface”.

Furthermore, as recited by claims 1, 8 and 16, the transparent structure is bonded to the substrate by a transparent adhesive layer. This ensures the optical connection between the transparent structure and the entire light emission surface of the substrate.

As such, the above effects (a) and (b) of the invention can be secured by the cooperation among the features, i.e., the transparent structure comprising “side surface”, the transparent structure being “optical connected with the entire light emission surface” of the substrate, and the transparent structure being bonded “by a transparent adhesive layer” to the substrate.

Such a combination of features is not taught or suggested by the cited references.

## II. THE PRIOR ART REJECTIONS

### Lin et al. ‘145 - Claims 1, 3, 5, and 21:

The Office alleges, with regard to claim 1, that Lin et al. ‘145 discloses a high-efficiency electro-optics device that comprises a semiconductor light-emitting element 260 including a substrate 270, where light radiates from a light emission surface of the substrate 270 of the light emitting element 260, the light emission surface being provided on the substrate 270 opposite to an electrode forming surface of the substrate, and transparent structure 250 mounted on the light emission surface of the substrate 270, where the transparent structure 250 comprises a side surface through which to allow the light be discharged from the transparent structure 250.

Lin’145 fails to teach the cooperation of the above features of the invention. More specifically, Lin’145 fails to teach or suggest the transparent structure being “optically connected with the entire light emission surface” of the substrate (of the light emitting element). Furthermore, Lin’145 fails to teach or suggest “an inorganic transparent structure” as recited by claims 1, 8 and 16. For example, Lin’145 only teaches using as a transparent structure “a transparent fixing-glue (paragraphs 0024, 0031) that is clearly different from the

inorganic transparent structure as described later.

Even if Lin et al. (US 6,603,151, herein “Lin’151”) may teach or suggest (arguendo) the transparent structure being “optically connected with the entire light emission surface” of the substrate, Lin’151 completely fails to teach the transparent structure comprising the “side surface”. Moreover, it would not have been obvious that the device of Lin’145 could be modified with the teaching of Lin’151 to provide the transparent structure being “optically connected with the entire light emission surface”. That is, even such a modification cannot complete the light emitting apparatus of the invention. The reasons are as follows.

In modifying the device of Lin’145 with the teaching of Lin’151, two cases may be presumed as below (arguendo).

Modification (A): One may be the case that the device of Lin’145 is modified (arguendo) such that the transparent structure (160, 250) of Lin’145 is formed optically connected with the entire light emission surface by removing a convex die carrier (130, 290) thereof. Here, Lin’145 mentions that the transparent structure (160, 250) is of a transparent fixing-glue (paragraphs 0024, 0031). In general, “glue” is defined as an adhesive obtained by boiling skins, hoofs, and other animal substances in water (e.g., See URL: <http://dictionary.reference.com/browse/glue>). In other words, the transparent fixing-glue of Lin’145 must be classified as an organic adhesive. Therefore, even when the transparent structure (160, 250) of the transparent fixing-glue is formed on the entire light emission surface, a serious problem will arise that the transparent fixing-glue (160, 250) is easily deformed by heat generated during the operation of the light emitting element, so that it is impossible to keep a long-term use of a light distribution characteristic based on a three-dimensional shape of the transparent structure as claimed. This is clearly evident ~~can be~~ proved by the fact that the device of Lin’145 always needs the rigid convex die carrier (130, 290) as well as the glue (160, 250) to mount the light-emitting cell thereon.

Another serious problem will arise that the transparent fixing-glue (160, 250) is easily colored or devitrified by a substantive amount of light irradiation during the operation of the light emitting element to reduce the light transmittance of the transparent structure (160, 250).

As such, in this modification (A), the light emitting apparatus of the invention as claimed cannot be completed even by modifying the device of Lin’145 with the teaching of Lin’151.

Modification (B): The other may be the case that the device of Lin’145 is modified such that transparent structure (160, 250) and the convex die carrier (130, 290) of Lin’145 are

together replaced by a transparent layer (140, 210) of Lin'151. However, it should be noted that the transparent layer (140, 210) of Lin'151 is by itself or independently not operable to reflect light emitted from an epitaxial structure (110) out of the device without a light reflective layer (145/146, 147/148, 215/216 or 217/218) formed inside a sinking surface of a die carrier (130, 200) (See col.3, lines 52-60 and FIGS.3A to 6B of Lin'151).

In other words, when using the transparent layer (140, 210) of Lin'151, it is always necessary to form the transparent layer (140, 210) inside the sinking surface of the die carrier (130, 200), as well as the light reflective layer. So, in a case of employing Modification (B), the transparent structure (160, 250) and the convex die carrier (130, 290) of Lin'145 must be replaced by the transparent layer (140, 210) inside the sinking surface of the die carrier (130, 200), as well as the light reflective layer (145/146, 147/148, 215/216 or 217/218). If thus replaced, then the device of Lin'145 must have the same composition as the device of Lin'151. As a result, as discussed in the previous Amendment dated April 13, 2007 concerning Lin'151, the replaced transparent layer (140, 210) in Lin'145 cannot have the "side surface through which light radiated from the light emission surface is discharged from the transparent structure".

As such, in this modification (B) (arguendo), the light emitting apparatus of the invention as claimed cannot be completed or produced, even by modifying the device of Lin'145 with the teaching of Lin'151.

As described above, Lin'145 fails to teach the transparent structure being "optically connected with the entire light emission surface" of the substrate (of the light emitting element) as recited by claims 1, 8 and 16.

In addition, even when the device of Lin'145 is modified with the teaching of Lin'151, the light emitting apparatus of the invention as recited by claims 1, 8 and 16 cannot be completed to comprise at least the transparent structure being "optically connected with the entire light emission surface" as well as the "side surface through which light radiated from the light emission surface is discharged from the transparent structure".

Thus, claim 1 is patentable over Lin et al. '145. Claims 3, 5, and 21 depend directly from claim 1 and are patentable over Lin et al. '145 for at least the same reasons.

Further, claim 4 depends directly from claim 1. As mentioned above, claim 1 is patentable over Lin et al. '145.

Lin et al. '151 has not been asserted against claim 1, and in any event does not cure the deficiencies of Lin et al. '145 noted above. Claim 1 and its dependent claim 4 are patentable over the proposed combination of Lin et al. '145 and Lin et al. '151.

**Lin et al. '145 and Lowery et al. - Claims 6-9, 14-20, and 22-23:**

The rejection as presented in the outstanding action contains errors that affect Applicant's ability to reply. The errors relate to inconsistencies and ambiguities in the Detailed Action regarding the two references to Lin et al.

More specifically, the outstanding action states, in the first full paragraph on page 4, that the rejection is based on "Lin et al. '145." The Office contends in the second full paragraph on page 4, though, that "Lin et al. disclose one of the lead frame 285 has a cup portion (fig. 5a), and the transparent structure 210 is fixed on the cup portion, but do not disclose the lead frame 285 has a cup portion, the transparent structure 250 is fixed on the cup portion, and the transparent structure 250 is fixed on the cup portion through adhesive resin with light diffusion material mixed in."

Applicant notes, however, that FIG. 5A is contained only in Lin et al. '151, and not in Lin et al. '145. Moreover, whereas Lin et al. '145 contains lead frame 285, shown in FIG. 5, Lin et al. '151 contains lead frames 135 and 205, shown in FIGS. 4A, 4B, 5A, 5B, but does not contain lead frame 285. Further inconsistency and ambiguity is apparent in the Office's description of the "transparent structure 210" shown in Lin et al. '151, but not in Lin et al.

In addition, Lowery et al. is described by the Office as teaching that die 12 is fixed on a reflector cup 14 connected to the lead frame 18, whereas Lowery et al. states that die 12 is fixed on a reflector cup lead frame 14 and is electrically coupled to lead 18. Further, the "adhesive resin 13" advanced by the Office does not appear in Lowery et al.

Applicant respectfully requests clarification of the rejection. Alternatively, Applicant respectfully urges that the rejection based on Lin et al. '145 and Lowery et al. be withdrawn.

Meanwhile, it is clear that Lowery et al. (US 6,351,069) is silent about the abovementioned features of the invention defined by the independent claims.

Therefore, the invention as claimed is not anticipated by Lin'145, and it is not obvious over Lin'145 in view of Lowery et al., or over Lin'145 in view of Lin'151.

**Hata, et al. (US 2003/0057434 A1) and Lin'151**

In the present Office Action, the Examiner alleges that "With regard to claims 12-13, Lin et al. (\*Note: not Lin'145 but Lin'151) modified by Hata discloses that the substrate is sapphire (Hata paragraph [0054]). Lin et al. (\*Note: not Lin'145 but Lin'151) disclose the transparent structure 210 is ITO, ZnO, IZO CTO etc. However, using sapphire as a material for the transparent structure is held as duplication of parts, which would have been obvious..." (Notes Added, page 6 lines 1-5 of the Office Action dated June 1, 2007).

First, as respectfully submitted above, the Examiner is confused between Lin'151

and Lin'145, where Lin'145 is silent about a material for the transparent structure (160, 250) and Lin'151 fails to teach or suggest "a side surface" through which light radiated from the light emission surface is discharged from the transparent structure. In other words, Lin'151 is by itself not relevant to the invention, as recited by Claims 12-13.

Second, even if Lin'151 is cited as a reference against Claims 12-13, the transparent conductor layer (140, 210) of Lin'151 is only formed of an electrically conductive material such as ITO, ZnO, IZO, CTO and NiO (See col.3, lines 32-35 of Lin'151, and claims 6, 11 and 19). Therefore, it would be difficult (and certainly not obvious) for one ordinarily skilled in the art to replace such an electrically conductive material taught by Lin'151, by an insulating material such as sapphire taught by Hata in case of forming the transparent structure, even when being held as duplication of parts.

As such, the invention as recited by Claims 12-13 would not have been obvious over Lin'145 in view of Hata.

Claims 10-13 depend directly from claim 1. Claim 1 is patentable over Lin et al. '145, as advanced above. Claims 10-13 are patentable over Lin et al. for at least the same reasons as claim 1.

Hata et al. has not been asserted against claim 1, and in any event would not remedy the deficiencies noted of Lin et al. '145. Claim 1 and its dependent claims 10-13 are patentable over the proposed combination of Lin et al. '145 and Hata et al.

### **III. FORMAL MATTERS AND CONCLUSION**

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1, 3-13, and 16-23, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the application be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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Docket No. PTGF-03083

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: \_\_\_\_\_

9/4/07



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